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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,690	02/11/2004	Tao Wu	102282-15	3833

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EXAMINER

KAO, CHIH CHENG G

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 03/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/776,690

Applicant(s)

WU ET AL.



Examiner

Chih-Cheng Glen Kao

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>12/27/05</u>  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Allowable Subject Matter***

1. The indicated allowability of claims 1-34 is withdrawn in view of the newly discovered reference(s) to Tam (US Patent 5270926) and Cheng et al. (US Patent 5909476). Rejections based on the newly cited reference(s) follow.

### ***Information Disclosure Statement***

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

### ***Drawings***

3. Regarding Figures 9A-11C, the drawings are objected to because objects in the figures are difficult to distinguish due to the contrast of the figures.

Regarding Figures 9A-9C and 11A-11C, the drawings are objected to because partial views intended to form one complete view, on one or several sheets, must be identified by the same number followed by a capital letter. View numbers must be preceded by the abbreviation "FIG."

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

#### ***Claim Objections***

4. Claims 14-34 are objected to because of the following informalities, which appear to be minor draft errors including grammatical and/or lack of antecedent basis problems.

In the following format (location of objection; suggestion for correction), the following correction(s) may obviate the objection(s): (claim 14, line 1, "the number"; replacing "the" with -a- -), (claim 15, lines 7-8, "a plurality of attenuation value"; replacing "value" with -values- -), (claim 15, lines 11-12, "the radiation absorbance projection images"; deleting "the"), (claim

25, line 2, "a different angles"; deleting "a"), and (claim 25, lines 5-6, "a plurality of attenuation value"; replacing "value" with - -values- -).

Claims 16-24 and 26-34 are objected to by virtue of their dependency. For purposes of examination, the claims have been treated as such. Appropriate correction is required.

***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 25-34 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 25-34 claim(s) a computer program. Computer programs are not physical "things." They are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer, which permit the computer program's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 2, 5, 14, 15, 18, 25, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Tam.

7. Regarding claims 1, 15, and 25, Tam discloses a method, system, and computer readable medium encoded with a computer program for imaging, comprising acquiring radiation absorbance images of a target element through a limited plurality of angles with a source and detector (fig. 12, and abstract, lines 1-3), and applying an iterative reconstruction algorithm (fig. 9, and col. 5, lines 26-28) to generate a three-dimensional reconstruction of the target element (abstract, lines 1-3), wherein the iterative reconstruction algorithm is applied using cone-beam forward projection (fig. 9, #72) and back projection (fig. 9, #64).

8. Regarding claim 2, Tam further discloses wherein the radiation absorbance images are acquired by transmitting x-ray energy from an x-ray source (fig. 12, #22) through the target element (fig. 12, #20) to an x-ray detector (fig. 12, #24).

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9. Regarding claims 5, 18, and 28, Tam further discloses wherein radiation absorbance images are acquired through a range of angles that is between about 30 and 120 degrees (fig. 12, #30).

10. Regarding claim 14, Tam would necessarily have a number of iterations less than or equal to about 10, when convergence is found almost immediately (fig. 9, #70).

11. Claims 1, 2, 6, 11, 15, 19, 24, 25, 29, and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Cheng et al.

12. Regarding claims 1, 15, and 25, Cheng et al. discloses a method, system, and computer readable medium encoded with a computer program for imaging, comprising acquiring radiation absorbance images of a target element through a limited plurality of angles with a source and detector (fig. 5), and applying an iterative reconstruction algorithm (title) to generate a three-dimensional reconstruction (col. 3, line 35) of the target element (abstract, lines 1-3), wherein the iterative reconstruction algorithm (col. 6, line 27) is applied using cone-beam forward projection (fig. 4, #406) and back projection (fig. 4, #407).

13. Regarding claim 2, Cheng et al. further discloses wherein the radiation absorbance images are acquired by transmitting x-ray energy from an x-ray source (col. 3, lines 25-26) through the target element (fig. 1, #103) to an x-ray detector (fig. 1, #106).

14. Regarding claims 6, 11, 19, 24, 29, and 34, Cheng et al. further discloses wherein the iterative reconstruction algorithm is necessarily a maximum likelihood algorithm implemented using an expectation-maximization algorithm (col. 8, lines 20-37).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 3, 7, 16, 20, 26, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tam as applied to claims 2, 15, and 25 above, and further in view of Malamud (US Patent 6483890).

16. Regarding claims 3, 16, and 26, Tam discloses a method, system, and medium as recited above.

However, Tam fails to disclose wherein an x-ray detector is a digital x-ray detector having a plurality of detector pixels.

Malamud teaches wherein an x-ray detector is a digital x-ray detector (col. 1, lines 15-24) having a plurality of detector pixels (fig. 2, #16).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method, system, and medium of Tam with the detector of



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Malamud, since one would be motivated to make such a modification for more easily processing signals with a computer (col. 1, lines 15-24) as implied from Malamud.

17. Regarding claims 7, 20 and 30, Tam further discloses wherein the three-dimensional reconstruction of the target element would necessarily be represented as an array of voxels having a uniform or non-uniform size in three-dimensions, which are characteristic of 3D CT images (abstract, line 2).

18. Claims 3, 7-10, 16, 20-23, 26, and 30-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng et al. as applied to claims 2, 15, and 25 above, and further in view of Malamud.

19. Regarding claims 3, 16, and 26, Cheng et al. discloses a method, system, and medium as recited above.

However, Cheng et al. fails to disclose wherein an x-ray detector is a digital x-ray detector having a plurality of detector pixels.

Malamud teaches wherein an x-ray detector is a digital x-ray detector (col. 1, lines 15-24) having a plurality of detector pixels (fig. 2, #16).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method, system, and medium of Cheng et al. with the detector of Malamud, since one would be motivated to make such a modification for more easily processing signals with a computer (col. 1, lines 15-24) as implied from Malamud.

20. Regarding claims 7, 20, and 30, Cheng et al. further discloses wherein the three-dimensional reconstruction of the target element is represented as an array of voxels having a uniform or non-uniform size in three-dimensions (fig. 2).

21. Regarding claims 8, 21, and 31, Cheng et al. further discloses wherein a forward projection step is implemented by ray tracing from the x-ray source to a detector pixel and the forward projection of the target element is obtained by necessarily repeating the ray tracing for each detector pixel to calculate an attenuation value for each voxel in order to reproject the volume (col. 7, lines 7-10).

22. Regarding claims 9, 10, 22, 23, 32, and 33, Cheng et al. further discloses wherein a back projection step is implemented by necessarily locating detector pixels containing attenuation information relating to a selected voxel and using those pixels to update the attenuation value of the selected voxel, and wherein the back projection step includes performing a back projection for at least each voxel corresponding to a three-dimensional reconstruction of the target element (col. 7, lines 11-21).

23. Claims 4, 17, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tam as applied to claims 1, 15, and 25 above.

Tam discloses a method, system, and medium as recited above. Tam further discloses wherein radiation absorbance images are acquired through a number of angles less than a number (col. 2, lines 56-64).

However, Tam fails to disclose a number of angles less than or equal to about 100.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method, system, and medium of Tam with the above number of angles, since where the general conditions of a claim are disclosed in the prior art, discovering the working ranges involves only routine skill in the art. One would be motivated to make such a modification to speed up imaging (col. 1, lines 45-46) as implied from Tam.

24. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tam as applied to claim 1 above, and further in view of Ning (US Patent 6480565).

Tam discloses a method as recited above.

However, Tam fails to disclose wherein a target element is at least a portion of a human patient, and wherein the target element is a breast of a female patient.

Ning teaches wherein a target element is at least a portion of a human patient, and wherein the target element is a breast of a female patient (title and cover page).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Tam with the breast target of Ning, since one would be motivated to make such a modification for more accurate detection of breast cancer (col. 3, lines 1-3) as implied from Ning.

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*Conclusion*

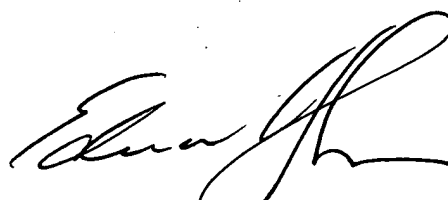
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



gk



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